A MAP

OF THE

LAKE REGION OF EASTERN AFRICA

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A MAP

OF THE

LAKE REGION OF EASTERN AFRICA

SHOWING THE

SOURCES OF THE NILE

RECENTLY DISCOVERED BY

DR LIVINGSTONE.

WITH NOTES

On the Exploration of this Region, its Physical Features, Climate and Population,

BY

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THE

LAKE REGION OF EASTERN AFRICA.

THE PROGRESS OF DISCOVERY IN THE LAKE REGION.

SINCE the end of the fifteenth century, when Vasco de Gama first rounded the Cape of Storms and reached the Indian Ocean by sea from the coasts of Portugal, the exploration of the southern part of the great continent of Africa has proceeded by slow degrees. Then, this region was a perfect blank to the civilized world; and though its hidden fastnesses have since that time been almost constantly assailed in the cause of knowledge from points all round its shores, it still conceals the greatest extent of unknown land on our globe, and any attempt to penetrate the veil of mystery which hangs over it has, on this account, a special interest. If one part of the South African continent has a greater attraction for the explorer than another, it is that which contains the headwaters of the Nile, whose delta-land of Egypt, near the cradle of the human race, has been well known from the earliest dawn of civilization, but whose sources have been the great unsolved problem of geography in all ages.

The Map, which these Notes accompany, shows the present condition of our knowledge of this great lake region of the sources; and here we propose to trace rapidly the gradual opening up of this part of the continent, by following the routes of the travellers who have succeeded in penetrating into it, and from whose discoveries the land has been so far mapped out; then, to show the bearing of the most recent explorations on the great geographical problem before mentioned; and lastly, to notice the main physical features of the Lake Region, its climate, and population.

Shortly after the great voyage of Vasco de Gama, the Portuguese had formed settlements on both coasts of South Africa, but their authority did not extend beyond the outer margin, and they do not seem to have been roused into action to explore the land which lay between their colonies, until, in 1796, Francisco de Lacerda, a gentleman of some scientific attainments, was sent to prosecute discoveries from their colonies of the Lower Zambesi on the eastern side.

On arriving at the colony, he found that his projects of discovery had been anticipated, and a path into the interior cleared for him by a private adventurer. A Creole, named Gonzalo Peréira, had established himself on the northern side of the Zambesi, about three days' journey from Teté, the furthest inland of the Portuguese settlements, and maintained a lucrative commerce with the native traders, whose sovereign was called the Cazembé, of whom we shall hear again. In May 1798, Peréira, accompanied by Dr Lacerda, and a numerous retinue, started from near Teté, and reached the town of the Cazembé, crossing on the way the river Arangoa, which was believed to be a tributary of the Zambezi, and a second Zambezi (the Chambeze of Livingstone); of which Lacerda observes, that it 'cannot be our Zambezi, or any of the rivers that join it;' but, notwithstanding this, the second Zambezi has, till very recently, been considered as the head stream of the former river. Two positions on Lacerda's route were astronomically determined by him, and he obtained intelligence from the natives of certain lakes and swamps, one of which takes three days to cross, but he died in the country of the Cazembe, and the greater part of the information which he had collected never reached Europe. In 1802, two Pombeiros,[1] or native mercantile traders, were sent into the interior from Angola on the west coast, for the purpose of exploring a route across the continent to the Portuguese possessions on the Zambezi. This they accomplished, and returned to Angola in 1814, being the first travellers who had crossed the continent. Their journal is totally deficient in a scientific point of view; but the interest of their route lies in this, that a great part of the ground which they crossed, has never since been traversed by any European. Starting from a factory in the interior of Angola, they crossed the Coango river, a tributary of the Congo, and then the Casai or Kassabi river, and the Lualua, its tributary, and reached the town of the 'muata,' or King Yanvo, the great potentate of Central South Africa. From this point their course appears to have been southerly, to avoid, or go round a mountainous region. They crossed the numerous tributary streams of the Lualua river, and afterwards turning more to the east, came to the domain of the lord of the frontier country, between the kingdoms of the Muato Yanvo and of the Cazembe. Rounding the southern part of the mountainous region, they passed over the ridges branching from a mountain called Impume, which were strewn with

Pombeiros.

[1] Pombeiro Baptista's name has been put beneath the positions taken from their route, which are marked on the map. These earliest journeys into South Africa were first brought together in a collected form in Mr Cooley's paper on the 'Geography of N'yassi.'—*Royal Geographical Societies' Journal*, vol. xv.

copper; and after visiting Muiro, the lord of the copper mines, and Quiburi, the chief of the salt marshes, they ascended and crossed over the summit of a ridge[1] which separates the waters flowing east and west.

Descending, they passed the Luviri river, which runs into the Luapula (the river now made known by Livingstone between Lakes Bangweolo and Moero), and crossing the Luapula in canoes, here fifty fathoms wide, came to the Cazembe's town of Lunda. The Cazembe's territory is described by the Pombeiros as low and cold, though the soil yields fruits and grass in great plenty.

The trade of the Cazembe is chiefly in slaves, ivory, and green-stones (malachite) from the country called Katanga, which he sells to the traders of the Zambezi.

The Pombeiros reached the Zambezi at Teté by nearly the same route as that which was taken by Dr Lacerda in going inland.

Passing over the expedition under Tuckey, in 1816, to the lower course of the Congo river (which does not enter the area of the map, but to which we shall afterwards refer), the next journey into the Lake Region is that of Major Monteiro, in 1830, over the ground formerly traversed by Dr Lacerda from Teté to Lunda, the Cazembe's capital. More fortunate than his predecessor, Monteiro returned to publish an account of his journey,[2] with a map of his route, which is still the most important geographical document for this part of Africa.

We now come to the time when the journeys of the man who must always be considered, by way of excellence, the explorer of South Africa, began to be made. Livingstone was sent to Africa in 1840, by the London Missionary Society, to labour among the Bechuanas; but it was not until ten years later that he entered the southern part of the Lake Region at the Zambesi, after many journies in the west of the Kalahari Desert, where his discovery of Lake Ngami, the centre of the continental drainage of Southern Africa, had already made his name famous.

Krapf and Rebmann.

Meanwhile the German missionaries Krapf, Rebmann, and Erhardt, began their labours on the east coast, near the equator; and in their stay from 1845 to 1852, they made known the snowy mountains of Kenia and Kilima Njaro, the summits of the eastern side of the plateau, and probably the highest points of Africa. They also spread the report of a vast inland sea, which was shown on their maps, extending from the Cazembe's country to the equator.

[1] Probably a pass over the Kone Mountains, of Livingstone.

[2] O Muata Cazembe. Lisbon, 1854. The coast survey of East Africa by the vessels of the British Admiralty was begun in 1822, and was carried out principally by the late Capt. W. F. Owen, R.N.

Graça. In 1846 a trader, named Joaquim Graça, set out from Angola for the interior, and succeeded in reaching the capital of the Muata Yanvo. He describes the country of king Yanvo as a vast plain, with great trees in the swampy places, and mentions a desert of forty days in breadth, lying between this and the Cazembe's dominions, which is undoubtedly the mountainous region that the Pombeiros went southward to avoid. In 1847 Ladislaus Magyar, a Hungarian, went to the Portuguese possessions, and thence into the interior of Benguela, where, the better to carry out his plans of exploration, he married a negro princess. His earliest journey was from this to the Congo river, in 1848, but the most important of his routes is that of 1850–51, in which he penetrated to the Kassabi river, and the country of the Muata Yanvo, from a more southerly point than the previous travellers. He has given a very complete account of the hydrography of this interior region, to which we shall afterwards refer.

Ladislaus Magyar.

Livingstone. We now (1850) find Livingstone entering the Lake Region. After a third journey northward from Kolobeng, he reached Linyanti, on the Chobe river, an affluent of the Zambezi, where he remained for two months before returning to his starting point, and collected a vast amount of information concerning the surrounding countries. In 1852 he had again penetrated to Linyanti, but was detained there by fevers till July 1853, when he proceeded to Sesheke, on the Liambey or Zambezi, and was the first European to embark on the upper course of this great river.

He describes the Zambezi here as often reaching a mile in width. It has densely wooded banks, the date palm and the slender palmyra rising high above the other trees. Above Sesheke, the banks of the river are rocky and undulating, and there are several cataracts. Higher up Livingstone found the elevated banks retreating, and leaving between them a flat valley of about 20 miles in width, which is annually flooded by the river, as Lower Egypt is by the Nile. The Barotse valley continues northward for about 100 miles. The numerous villages in it are protected by artificial embankments, and the inundation is made use of for the cultivation of maize and other grains, whilst the richness of the land in cattle and fruits, and the fish from the river, make it indeed a land of plenty. Above the widening of the valley, the wooded banks of the river again closed together, and shortly afterwards the traveller came to the confluence of the Leeba and Liambey, the latter of which streams, flowing from the north-east, is probably the head stream of the river. Having explored the river thus far, Livingstone turned back in August to Sekeletu's town, where he remained till November of 1853. Seeing that this rich land of the upper Zambezi

valley was cut off from all communication with the outer world, and that its inhabitants did not know the great value of its ivory and other products, Livingstone resolved to seek a way for traffic to the west coast, and was aided by supplies and an escort from Sekeletu, who understood the importance of this opening to the prosperity of his kingdom. The new expedition proceeded rapidly up the river to as far as the junction of the Leeba, and the voyage was continued up this tributary; a waterfall, however, prevented the passage of the boats, and the journey had to be made henceforth by land. Livingstone had now entered the country which is under the sway of the Muata Yanvo, the first chief in the new territory by whom he was received being Shinté, or Kabompo, whose town is in 13° S. lat. Further on, he discovered the small lake Dilolo, on the water parting between the Zambezi and Kassabi rivers, 4700 feet above the sea. The description which Livingstone gives of the Muata Yanvo's country agrees with that of the former traveller Graça. Its surface is in general flat, and in it woods interchange with open grassy meadow-like valleys. On the other side of Dilolo a great flooded country was passed, and afterwards the land of a hostile tribe, who form the great barrier here to traffic with the west coast, till, reaching the Coango river, Livingstone came more easily through the partly civilized Portuguese territory to St Paul de Loanda, on the coast. This point he reached in May 1854, but in a sinking condition, worn out with fevers and dysentery. Here we shall leave the great traveller, to notice a second journey across the continent, accomplished by a Portuguese trader named Silva Porto.[1]

Silva Porto.

This traveller set out from Benguela in June 1853, and reached Katongo on the Zambezi, nearly at the time when Livingstone was returning from his first excursion up the river. Starting from this point, the further route of Silva Porto leads eastward through a country in the south of the lake region previously quite unknown, and of which his narrative gives the only information as yet possessed. His course was first due east, across numerous tributary rivers flowing south to the Zambezi, to as far as a place called Camimbe. He describes the country here as generally plain, everywhere fertile, with occasional woods and brushwood. The largest of the rivers, which he crossed in canoes, was named the Loengue, and is probably the upper course of the Kafue river, a large tributary of the Zambezi, afterwards visited by Livingstone. Turning from Camimbe up the basin of this river, Silva continued his journey northward through a still fertile country; and after again twice crossing the river, reached

[1] A journey brought before the notice of the Royal Geographical Society by Mr Macqueen in 1860. Journal, vol. xxx.

Camussango, a place which, by his distances and directions from Katongo (astronomically fixed by Livingstone), appears to be in about 12° 30′ S., long. 27° 30′ E. From this his route was again eastward for about 300 miles along the base of the great Muchinga range of mountains to the Arangoa river, at which point his track crossed the older ones of Lacerda and Monteiro. One of the outlying mountains of the Muchinga chain (which he calls the Sierra Ueenda) was ascended by Silva. He describes the view from the summit as the most beautiful he ever beheld, or that could be imagined, so grand that he spent a whole day in admiring it. Beyond the Arangoa, Silva passed through the territories of several hostile and opposing tribes, and his route is, on this account, uncertain; but it appears that he rounded the southern end of Lake Nyassa, which he calls the Rio Nhionja, and then travelled north-eastward through a rich and well-watered country, occasionally mountainous, and in some parts wooded, to where he came upon the Rovuma river, at about 100 miles from its mouth. Going down the river, he came to the east coast near Cape Delgado in August 1854, having spent a year and two months in his tedious march.

Livingstone.

We now return to the west coast to Loanda, to follow Livingstone in a journey in which he no less completely crossed the land from sea to sea.

Although Livingstone had suffered severe privations in reaching the west coast, and now lay on a sick-bed there, yet believing it to be his duty to return to the Zambezi with the Makololo men who had accompanied him, and considering that the route which he had just accomplished was too full of danger and difficulties to serve as an opening for regular traffic, he resolved to return, and in doing so, to seek a more suitable passage.

With the plan of visiting the Muata Yanvo, and of then turning southward into the Zambezi valley, Livingstone faced inland again in September 1854; but after remaining for some months in the interior of Angola, and ascertaining by short excursions the capabilities of this country, he yielded to the wish of his escort, who were becoming home-sick, and relinquishing his intention of visiting the king Yanvo, turned southward down the Leeba and Zambezi, arriving at Linyanti again in September 1855. A month after this, accompanied by more than one hundred volunteers of the Makololo, he continued his journey down the Zambezi in boats; but not far below the confluence of the Chobe, the rapids compelled the expedition to take to the land. Before continuing his route overland, to meet the river at a lower part of its curved valley, Livingstone visited the great falls of Mosiwatunja, the wonder of South Africa, which he afterwards

named the Victoria Falls. From the Kafue river, a tributary of the Zambezi, which the expedition reached in its overland march, the route lay along the left bank of the river, through thorny bush, and most of the burthen cattle were lost from the bites of the tsetze fly, the plague of the Zambezi valley, as indeed of many of the valleys and lower grounds of south-eastern Africa.

Between the mouth of the Kafue, and the ruins of the abandoned Portuguese station of Zumbo, at the mouth of the Loangwa tributary (the head of which was discovered by Lacerda in his journey to the Cazembe), the country is undulating, without trees, and covered with short grass. Fever is here unknown, and agriculture could be carried on to perfection. There is abundance of game, buffaloes, giraffes, zebras, and antelopes; elephants and springboks repeatedly show themselves in vast herds. The whole distance from this down the river bank to the Portuguese settlement at Tété had to be traversed on foot, and Livingstone arrived there in a state of complete exhaustion in March 1856. Remaining here till the end of the month, since the delta region of the river is unhealthy up to this season, Livingstone then completed his journey to the coast, reaching Quilimané in May. This third great journey across the continent, which opened up such a vast and rich territory, had occupied nearly the same time as the second one, that of Silva Porta, or a year and two months. In December of 1856, after fifteen years of African labour, Livingstone again set foot on English soil.

Burton and Speke.

The year 1857 brought the well-remembered expedition under Captain Burton, from Zanzibar to the interior, to ascertain the truth about the great inland sea of the German missionaries, which opened up to our knowledge the great plateau of land occupied by the Unyamwesi tribes, and explored the Tanganyika lake, leaving however the question of its outflow or supply undecided. The existence of a still greater lake was reported to these travellers at Ujiji; and Captain Speke leaving his companion at Tanganyika, went northward and discovered the southern portion of the Great Victoria Nyanza, which he then supposed to be the head reservoir, or source of the Nile.

In June 1858 we again find Livingstone entering the Zambezi in his little steamer 'Ma Robert,' with which, in the following year, he navigated up the Shiré river, an important affluent of the Zambezi, flowing through a beautiful and fruitful valley enclosed by mountains, which are wooded to their summits. The voyage was easy for more than 100 miles from the confluence to where the river descends from the plateau, and cataracts extend for 35 miles.

From these cataracts Drs Livingstone and Kirk went on foot

through a mountain region, which lies to the east of the Shiré, and in April 1859, discovered the Shirwa lake, the most southerly of the great African chain, embosomed in high mountains. In September of that year Dr Livingstone had followed the course of the Shiré river up to where he found it flowing out of the great Nyassa. This march was over a well-watered and hilly country. After crossing overland from the Shiré, to Teté on the Zambezi, Livingstone and Kirk set out up the Zambezi to conduct to their home the Makololo men who had followed Livingstone as far as this point, in his journey down the river in 1855, and who had here awaited his return from England. The journey was made on foot along the northern bank of the river, and this time Livingstone filled up the gap in his knowledge of the course of the Zambezi, by exploring that part of it which flows between the Kafue river mouth and the Victoria Falls, which his former short route had left unsurveyed.

In November 1860, the travellers came back to Teté, having accomplished their purpose. Meantime, the paddle-steamer 'Pioneer' had arrived for Livingstone in the Zambezi, and in February of 1861, he set off in it round the coast to the mouth of the Rovuma river, with the intention of penetrating this way to the Nyassa, out of which lake the river was reported to flow.

Speke and Grant.

During Livingstone and Kirk's journey up the Zambezi, Captain Speke, with his companion Grant, had left Zanzibar (October 1860), to cross overland to Gondokoro and the Nile, as well as to further explore the great lakes which the former journey in this region had discovered. This expedition reached Kazé, on the Unyamwesi plateau, by the same caravan route which Captain Burton had previously followed. From Kazé, Speke turned northward, and made his way through the territories of the chiefs in the country between Tanganyika and Victoria lakes, and in January 1862 obtained his second view of the Great Nyanza, at a point on its western shore. Proceeding round the northern coast, he discovered the outlet of this vast lake, and named it the Ripon Falls; then traced this outfalling river, which he named the Somerset, to its junction with the White Nile, above Gondokoro; also reporting a lake or backwater of the river to westward, called the Little Luta N'zige, which was afterwards to develop itself into the Great Albert Lake of Baker.

Roscher.

In 1860 a German traveller, Dr Roscher, penetrated from the east coast at Quiloa to the eastern side of Lake Nyassa; after suffering in the most dreadful manner from robbery, fever, and hunger, he reached the shores of the lake within a few days of the time that Livingstone had first discovered its southern outlet, but only to fall a martyr to

the cause of African exploration, shot down by the poisoned arrow of some jealous savage. Intending to join Dr Roscher in a united expedition which would combine the wealth of the one with the scientific knowledge of the other, Baron von der Decken reached Zanzibar in 1860, only to find that Dr Roscher had already been killed near Nyassa. After an attempt to reach the scene of Dr Roscher's death, Von der Decken returned to Zanzibar, and relinquishing the scheme of exploring Nyassa, turned his attention to the snowy mountains under the equator. He succeeded in reaching and determining the position of one of the colossal volcanic mountains of Eastern Africa—Mt. Kilima Njaro—and in ascertaining its height, as well as that of the snow line here, at 16,400 feet. Von der Decken.

His routes also opened up the interesting country which lies between the slope of the plateau and the coast.

In 1864, Samuel Baker (now Sir Samuel) ascending the Nile, penetrated further into the continent than any European coming from the north had previously done, and discovered the second great reservoir of the Nile, which he named the Albert Nyanza,—a vast inland sea of fresh water, flanked on its western side by high mountains. The river from Victoria Lake enters and again leaves the northern end of the Albert Lake, on its way to join the river of Gondokoro. Baker.

In the early part of the same year an elephant-hunter named Piaggia, an Italian, had penetrated southward from the swamp region of the Bahr el Ghazal, west of the Upper Nile, to within three degrees of the equator. The furthest point of his route, a place named Kifa, is, according to his report, 60 miles north of the shores of a vast lake, which has been laid down on the map, from his and other information. Out of this lake a great river flows to north-westward. Piaggia only heard of this river, but lower down in its course it has been visited by the brothers Poncet, who confirm the statement of its issuing from a great lake. Piaggia.

Towards the end of 1864, we find von der Decken, the enterprising measurer of Mount Kilima Njaro, returning to Zanzibar with two small steamers, for the better exploration of the river of the east coast. After visiting the mouths of several of the rivers north of Zanzibar, he turned to the great river Jub or Juba, which separates the hostile Somauli and Galla tribes, but after ascending this river for about 150 miles, his vessel was wrecked on the rapids, and having separated from his party to pioneer a route into the interior by land, it is to be feared that he fell a prey to the jealousy of the savages, and his men only succeeded in getting back to the coast through great dangers.

Livingstone. We left Livingstone entering the Rovuma river, in his new steamer 'Pioneer,' in March 1861. This vessel proved to require too great a depth of water for the exploration of this, or of any south African river. Having then returned to the Zambezi in August of this year, he navigated the Upper Shiré, in a boat which he had succeeded in transporting past the cataracts. Launching out on the Nyassa, he explored the whole length of its eastern coast for nearly 200 miles, by land and by water. The little boat in which the voyage was made, was unable to cross the lake at the period of the equinoctial gales, and the country northward of the lake being completely depopulated, no food could be obtained, and so a retreat was compelled.

In 1862 Livingstone again sought a way into the interior by the Rovuma river, and this time he succeeded in penetrating in boats for about 120 miles from its mouth, to where further progress was stopped by rapids.

Next year he had returned to the Zambezi, and planned an expedition to ascertain whether any large river enters the upper part of Lake Nyassa, by sailing to the northern end; for, at this time, the prevailing belief among geographers was that Lake Tanganyika had its outflow to the southward. With a few natives and a small boat, he ascended the Shiré to the cataracts; but from the mismanagement of his followers in making the portage, the boat was carried over the cataracts and destroyed. This accident altered his plans; but Livingstone determined to proceed to the north-west on foot, and leaving the Shiré, he crossed overland to the eastern side of the Nyassa. From the centre of the eastern shore he turned westward, ascending out of the depression in which the lake is sunk, up to the plateau. He describes the way as a 'long ascent, adorned with hill and dale, and running streams, fringed with evergreen trees, very beautiful to the eye.'

Livingstone travelled for about 90 miles due west, on the slave route to Katanga and the Cazembe's country, and reached as far as Chinyanga (perhaps the Quicanja of Monteiro), on or near the route which Lacerda and Monteiro took from Teté to Lunda.

Travelling in the slave route, hinderances of every sort were put in his way. The food brought with them became expended, and the natives refused to sell them any, so that Livingstone was compelled to return. In 1864 he crossed to Bombay in his steamer the 'Lady Nyassa.'

Mauch. During 1866 and 1867 very important journeys were made by the German explorer and pioneer Mauch, in the country south of the lake region, between the Transvaal republic and the Zambezi, of which Mosilikatse is chief. In these travels, the journal of which is a model of industry in every branch of scientific exploration, Mauch had the

good fortune to discover a country, which, besides its other capabilities, is rich in gold fields. Here also, however, the scourge of the tsetze fly, for whose bite no antidote has as yet been discovered, prevents the peopling of a great part of the rich lower valleys, since any cattle which stray into these are soon destroyed. This traveller is now continuing his valuable explorations in this region.

In the same years the missionary Brenner traversed the vast country between the Dana and the Juba rivers, on the north-east coast of the lake region, and added greatly to the knowledge of the level lands beneath the edge of the plateau there.

In 1866 the indefatigable Livingstone is again in Africa, with the determination of filling up the gaps in our knowledge of the Lake Region, from Nyassa to Tanganyika, beginning the great journey from which he has not yet returned.

News arrived in England in September 1866 that the traveller had, for a third time, entered the Rovuma river, and had succeeded in penetrating for 130 miles from its mouth, where he found a friendly chief, whose residence he intended to make the starting point of his expedition to the northern end of Nyassa and the south of Tanganyika. A long period of silence then intervened, during which we were ignorant of the whereabouts of the traveller, till a report was brought to the east coast by some lying Johanna men, who had deserted him, that Livingstone had been murdered near the south end of the lake. This report, however, was discredited by the head of the Royal Geographical Society, and a boat expedition sent out by the Society, under the leadership of Mr Young, confirmed the opinion of its untruth.

From his more recent letters, we learn that Livingstone passed round the southern end of Lake Nyassa, where he seems to have struck into nearly the old route of Lacerda and Monteiro, along the water-parting, between the tributaries of the Zambezi and of the Nyassa.

Passing at a distance of about 20 miles to westward of Chinyanga, the furthest point which he had reached in his excursion of 1863 from Nyassa, he got into the valley of the Loangwa or Arangoa. The greater part of Livingstone's subsequent route is contained in his letter of date July 1868. In this he says,—'Leaving the valley of the Loangwa, which enters the Zambezi at Zumbo, we climbed up what seemed to be a great mountain mass, but it turned out to be only the southern edge of an elevated region, which is from 3000 to 6000 feet above the sea. This upland may be roughly stated to cover a space south of Tanganyika, of some 300 miles square. It slopes to north and west, but I have found no part of it under 3000 feet of altitude.

The country of Usango, situated east of the space indicated is also an upland. . . . Usango forms the eastern side of a great but still elevated valley. The other, or western side, is formed by what are called the Kone mountains, beyond the copper mountains of Katanga.'

Livingstone continues—'The southern end of the great valley, enclosed between Usango and the Kone Mountains, is between 11° and 12° S. In 11° 6′ S., ascending from the valley of the Arangoa, we were fairly on the upland.' This was perhaps in January 1867, or about the middle of the rainy season here. He writes—'As we advanced, brooks, evidently perennial, became numerous. Some of these brooks went eastward, to fall into the Loangwa; others went north-west, to join the Chambeze.' The Chambeze, with all its branches, flows from the eastern side into the centre of the great upland valley, 'which,' says Livingstone, 'is probably the valley of the Nile. It is an interesting river, helping to form three lakes, and changing its name three times in the 500 or 600 miles of its course. I crossed the Chambeze in 10° 34′ S., and several of its confluents, north and south, quite as large as the Isis at Oxford, but running faster, and having hippopotami in them.'

Livingstone reached a place called Bemba, on the plateau, in February 1867, and fixed its position in 10° 10′ S., 31° 50′ E. Proceeding northwards, in April 1867 he discovered Lake Liemba. It lies in a hollow, with precipitous sides 2000 feet down, on the northern slope of the upland. 'It is extremely beautiful, sides, top, and bottom being covered with trees, and other vegetation. Elephants, buffaloes, and antelopes feed on its steep slopes, whilst hippopotami, crocodiles, and fish swarm in the waters. It is as perfect a natural paradise,' writes Livingstone, 'as Xenophon could have desired. On two rocky islands men till the land, rear goats, and catch fish. The villages ashore are embowered in the oil palms of the west of Africa. Four considerable streams flow into Liemba, and a number of brooks, from 12 to 15 feet broad, leap down the steep bright red clay, such are the rocks, and form splendid cascades, that made the dullest of my attendants pause and remark with wonder.'

Livingstone does not give any note of the direction of these four rivers, which flow into the lake; but it appears a necessary conclusion, from the position of the lake, that these should have their rise on the higher side of the plateau, and flow to the lake from the east.

'The lake is from 18 to 20 miles broad, and from 35 to 40 miles long. It goes off to north-north-west in a river-like prolongation, two miles wide—it is said to Tanganyika.' Livingstone continues—'I would have set it down as an arm of Tanganyika, but that its surface

is 2800 feet above the level of the sea, while Speke makes the lake Tanganyika 1844 feet only.' The observation of Livingstone here confirms the opinion of Mr Findlay, given in an able paper read before the Geographical Society in 1867, in which by a recomputation of the thermometer heights measured by Captain Speke, he came to the conclusion that Tanganyika Lake was at an elevation of 2800 feet above the sea; and that since its fresh waters must have an outlet, this would most probably be found to be to northward.

Livingstone continues—'I tried to follow this river-like portion of Liemba, but was prevented by a war which had broken out between the chief of Itawa and a party of ivory traders from Zanzibar. I then set off to go 150 miles south, then west till past the disturbed district, and to explore the west of Tanganyika, but, on going 80 miles, I found an Arab party, showed them a letter from the Sultan of Zanzibar, which I owe to the kind offices of his Excellency Sir Bartle Frere, late governor of Bombay, and was at once supplied with provisions, cloth, and beads.' . . . 'After peace was made, I visited Nisama, the chief of Itawa, and having left the Arabs, went on to Lake Moero, which I reached on the 8th September 1867. In the northern part Moero is from 20 to 33 miles broad. Further south it is at least 60 miles wide, and it is 50 miles long. Ranges of tree-covered mountains flank it on both sides, but at the broad part the western mountains dwindle out of sight.'

Lake Moero is the central one of the three on the Chambeze river. The river runs into Lake Bangweolo, at the head of the valley, and on coming out of it assumes the name of Luapula. The Luapula flows down north, past the town of the Cazembe, and 12 miles below it enters Lake Moero. Passing up the eastern side of Moero, Livingstone came to the Cazembe town. It stands on the north-east bank of the lakelet Mofwe. This is from 1 to 3 miles broad, and nearly 4 miles long. It has several low reedy islands, and yields plenty of fish, a species of perch. It is not connected with the Luapula or Moero.

'I was forty days at Cazembe's,' says Livingstone, 'and might then have gone on to Lake Bangweolo, which is larger than either of the other lakes, but the rains had set in, and this lake was reported to be very unhealthy.' 'I then went north for Ujiji, where I have goods, and I hope for letters, for I have heard nothing from the world for more than two years; but when I got within thirteen days of Tanganyika, I was brought to a standstill by the abundance of water in front. A native party came through and described the country as inundated, so as to be waist deep, with sleeping places difficult to find. This flood lasts till May or June. At last I became so tired of inactivity that I doubled back on my course to Cazembe.'

In this attempt to reach Ujiji, Livingstone appears to have intended to reach the west side of the Tanganyika by the road which Captain Speke reported from Warruwa (evidently the Rua of Livingstone) to the ferry by which he had crossed from Ujiji; and it was apparently during this attempt that Livingstone obtained, by actual observation, the report which he gives of the lower course of the Luapula. He says, 'On leaving Moero at its northern end, by a rent in the mountains of Rua, the river takes the name of Lualaba, and passing on north-north-west forms Ulenge in the country west of Tanganyika. I have only seen it where it leaves Moero, and where it comes out of the crack in the mountains of Rua.'

The flat inundated country beyond this seems to have been his turning point. He says, 'To give an idea of the inundation, which, in a small way, enacts the part of the Nile lower down, I had to cross two rivulets, which flow into the north end of Moero—one, the Luo, had covered a plain abreast of Moero, so that the water on a great part reached from the knees to the upper part of the chest. The plain was of black mud, with grass higher than our heads. We had to follow the path which the feet of passengers had worn into deep ruts. Into these places we every now and then plunged, and fell over the ankles into soft mud, while hundreds of bubbles rushed up, and bursting emitted a frightful odour.'

Having returned to Cazembe's in about February or March of 1868, Livingstone seems to have gone south at the beginning of the dry season, to Lake Bangweolo, 'which is larger than either of the other lakes' on the Chambeze, and from which his letter is dated in July 1868.

The next news we have of the great traveller is in a letter from Ujiji, on Lake Tanganyika, dated May 1869. He appears to have reached this point by the *eastern* side of Tanganyika, not by the western, as before attempted; since he writes in the above letter, 'As to the work to be done by me, it is only to connect the sources which I discovered from 500 to 700 miles south of Speke and Baker's, with their Nile. The volume of water which flows north from latitude 12° S., is so large, that I suspect I have been working at the sources of the Congo as well as those of the Nile. I have to go down the eastern line of drainage to Baker's turning-point. Tanganyika, Nyige Chowambe (Baker's?) are one water, and the head of it is 300 miles south of this. The western and central lines of drainage converge into an unvisited lake west or south-west of this.[1] The outflow of this lake, whether to Nile or Congo, I have to ascertain.' From the above it would appear that Livingstone had made an excursion northward

[1] Apparently Lake Ulenge.

from Ujiji, either by land or on the lake, to ascertain the union of the Tanganyika with the Albert Nyanza.

News has since been received which shows that Livingstone was still at Ujiji in July 1869. In January of this year (1870), a report arrived from the west coast of the continent, describing the fearful end which the traveller had come to, of his being quartered and burnt; but this report turns out to be an old story of date June 1868, with its plot laid on the Zambezi, and at that time we know that Livingstone was safe on the Chambeze lakes.

THE SOURCES OF THE NILE.

The main point of interest in the latest travels of Livingstone, and that which gives to them a distinctive importance over the great accomplishments of his former journeys, is that in these Livingstone has undoubtedly visited and beheld the long sought for sources of the Nile. It is true that there is considerable doubt as to which of the basins that he has explored will ultimately be recognized as the cradle of the Nile, but this at least is certain, that the real head streams have been visited by Livingstone, and the long-vexed question has, by these last explorations, resolved itself into a choice between two or perhaps three, main streams.

Livingstone himself has apparently no bias in favour of one or other, so that the discussion is a perfectly open one. The three rival head streams are first, the feeders of Lake Liemba, and second, the Chambeze and its lake chain, both of which rise near the eastern edge of the great longitudinal plateau of the side of Africa next the Indian Ocean; the third is the source recently claimed for the Nile by Dr Beke in his 'Solution of the Nile Problem,'[1] the Great Casai or Kassabi river, which rises nearer the Atlantic side in 12° S. Of the first of these, the feeders of Lake Liemba, we may say with almost absolute certainty, that they are tributaries to the Nile, and it is most probable that they are the *sources* of that river. Livingstone has found these rivers flowing into Lake Liemba; a river-like prolongation unites Liemba and Tanganyika, these two appearing to be at the same level; then Tanganyika and Nyige Chowambe, which is evidently the Albert Nyanza,[2] are 'one water,' and that this last is a reservoir of the White Nile is undoubted.

[1] Athenæum, February 1870.

[2] The doubt as to the union of Tanganyika with the Albert Lake, or of the identity of this lake with the Nyige Chowambe, is reduced to a minimum, if we notice how difficult it is to conceive a river flowing out of Tanganyika to northward, and escaping the Albert Lake, if this great inland sea has the south-western extension which is reported. If, however, the Tanganyika be disconnected with the Nile, the only outlet for it is in the Congo.

The union of the second presumptive head stream, the Chambeze, with the Nile, is less apparent; indeed the balance of evidence seems to show that it must be the head of the other great river of Africa, the Congo. If the Chambeze prove to join the Nile, then the streams to the Lake Liemba become mere tributaries, since the course of the Chambeze is by far the longer of the two. The feeders of Liemba and the Chambeze rise, however, side by side, on the eastern plateau, and the latter flows down into the central valley through Lake Bangweolo, and then northward through Lake Moero. Livingstone describes Lake Moero as beginning 12 miles below the position of the town of Lunda, the capital of the Cazembe (lat. 8° 40′ S., long. 28° 20′ E.), whose position may be laid down with tolerable accuracy from the former journeys of the Portuguese travellers. Since Livingstone proceeded north from Cazembe's town, along the eastern shore of Moero, in his attempt to reach Ujiji in 1867, the great bulk of this lake must lie to the westward of the meridian of Lunda, or about 120 miles west of Tanganyika. Dr Livingstone has seen the river at its outflow from the lake, and also at the point where it emerged from the crack in the mountains of Rua, when, according to his own observation, the river turned north-north-west to form Ulenge, a third lake or marsh in the country west of Tanganyika. This north-westerly turn would carry the river quite out of the direction of the Nile basin, and the higher side of the continent being to the east, the probability is that the river continues to curve to the westward.

Again, the valley of the Chambeze, in the plateau where Livingstone crossed it, is, no doubt, one of the greatest hollows in the highland, so that the height of the river bed here may be taken at 3000 feet, the lowest level of the limits which Livingstone gives to the undulation of the plateau, or only 200 feet above the level of Tanganyika. Descending into the great valley to Lake Bangweolo from the plateau, the Chambeze must have a considerable fall; from Bangweolo to Moero there must be a second descent. The Cazembe's country, which extends round to the south of Tanganyika, is described as flat, and its rivers are currentless and stagnant. If Moero were at a higher level than Tanganyika, would not the river which leaves it take a course over this level country instead of facing towards, and making its way through a crack in the mountains northward? Seeing that the river does force its way through these mountains, the presumption is that Moero is at a lower level than Tanganyika; and if this be the case, the river which descends from it through the gorge can never again ascend to the level of the Nile lakes to join them, but must find some other course.

With regard to the third advocated source, the Kassabi river, of which Dr Beke affirms it to be his belief that it is the head stream and upper course of the Nile of Egypt, the difficulties of its joining the Nile appear to be even greater than the last. The upper course of this river only has been explored. It springs in the Mossamba mountains, which are on the inner borders of Angola and Benguela, its sources being close to those of the Quango river, a tributary of the Congo. The Kassabi is known to flow northward as far as 8° S. to westward of the capital of the Muata Yanvo.

Dr Livingstone crossed its head on his journey from the Zambezi to Loanda, and the reports which he collected from the subjects of the Muata Yanvo's kingdom, all tend to prove that whatever direction its middle course may take, in its lower course the Kassabi flows round to westward, and is joined by the Quango. The trader Graça, who penetrated to the Muata Yanvo capital in 1846, says, 'that the territory of this chief is "shut in" by the great rivers Kassabi and Lurua (a tributary of the Kassabi). These rivers,' he continues, 'flow into the river of Sena' (the Zambezi). The latter part of this statement we now know to be incorrect; but taken as a whole, it indicates an easterly bend in the lower course of the river to enclose the kingdom of the Yanvo on the west and north, and to flow as if to the Zambezi. The Hungarian traveller, Ladislaus Magyar, has penetrated furthest of the three who have visited this region, and his report seems to agree well with this last. He states that the Kassabi, after forming the waterfall of Muewe (in about 11° S. latitute), bends gently to northward; but further on takes an easterly direction in its lower course, and reaches a breadth of several miles at the place where it *touches upon* the extensive lake Mouva or Uhanja.

Now, if we turn the Kassabi river eastward in latitude 8° S., in agreement with the above description, we find that it meets the position which Livingstone's letters give to Ulenge, the lake or marsh to which the Chambeze river flows, and whose waters Livingstone tells us by report, in his recent letters, are *taken up* by the Lufira, a large river which, by many confluents, drains the western side of the great valley.

Is not the *Lufira* then, the lower course of the Kassabi, and the lake Ulenge of Livingstone, whose waters are *taken up* by the Lufira, the Uhanja lake of Magyar, which the lower Kassabi *touches* upon?

The same difficulties which appear in the way of the Chambeze river and lake chain joining the Nile, hold also against the Kassabi, which, from the above reports, would seem to join this river at lake Ulenge.

Next, the question arises, if these rivers do not form a part of the

Nile system, where then shall we find an outlet for them? The answer to this is plainly, in the Congo river.

The Congo was described by the Jesuit missionaries, who first visited its mouth, as so 'violent and so powerful from the quantity of its waters, and the rapidity of its current, that it enters the sea on the west side of Africa, forcing a broad and free passage (in spite of the ocean) with so much violence, that for the space of 20 leagues it preserves its fresh waters unbroken by the briny billows which encompass it on each side.' In the introduction to his narrative of his expedition to the Congo, Tuckey says, 'if the calculation be true that the Congo, at its lowest state, discharges into the sea two millions of cubic feet of water in a second, the Nile, and the Indus, and the Ganges, are but rivulets compared with it, as the Ganges, which is the largest of the three, discharges only about one-fifth of that quantity at its highest flood.' This estimate may be considerably exaggerated, but Tuckey actually found that this vast river has a width of two, three, or even four miles, whilst flowing with a current of two or three miles an hour (p. 342 of narrative), and this not at its mouth, but inland beyond the mountainous coast regions. Such a vast river cannot be formed in a short course, but must have its rise far in the interior of the continent.

If we take the Kassabi river and its drainage to the Nile, where shall we find a sufficiently lengthened course for the Congo?

Tuckey's unelaborated notes give the opinion that the 'extraordinarily quiet rise[1] of the river show it to issue from some lake, which had received almost the whole of its waters from the north of the line;' and again, he says, 'I cannot help thinking that the Congo will be found to issue from some large lake or chain of lakes, considerably to northward of the equator.' The reason of Tuckey's supposition that the lakes, which evidently maintain the volume of water in the Congo, would be found north of the equator, is this, that he found the rising of the river beginning on the first days of September. At the time of his journey little or nothing was known of the times of the rainy seasons in Central Africa from actual experience. Since then the traveller Burton has told us (in his account of the expedition to Tanganyika, R. G. S. Journal, vol. xxix.), that in the latitude of Tanganyika the rains set in at the end of August, lasting till May; and Livingstone says, in his latest letter, that he did not proceed to

[1] The maximum rise of the Congo is 11 feet, generally only 8 to 9 feet. The White Nile, at Khartoum, rises 18 feet, notwithstanding the great lakes which supply it; and the Zambezi, above the confluence of the Shire river, has been observed by Livingstone to rise as much as 80 feet perpendicularly.

lake Bangweolo from the Cazembe's capital, where he arrived about the middle of September, *because the rains had set in.* Lake Ulenge lies between these latitudes, so that the rise of the waters of the Congo on the first of September is perfectly explainable without the necessity of taking its reservoir lakes to the north of the equator; if the lakes were there, the rise of the Congo would occur at a much earlier period of the year, as we shall afterwards notice, and, indeed, the space in which lake Ulenge lies, seems to be the only one on the continent whose rainy season would agree with the observed rise of the Congo.[1]

THE PHYSICAL FEATURES OF THE LAKE REGION AND THE LAKES.

The great highlands of the world encircle and turn their steepest verge towards the Pacific and Indian Oceans; the slope is gentle towards the great plains which surround the Atlantic and Arctic Seas. Africa is no exception to this rule, since it presents to the Indian Ocean the abrupt descent of the plateau which extends along its eastern side from the Cape Colony to Abyssinia, northward. It is true that the whole of South Africa is a plateau, with a general elevation of about 3500 feet, and that the outer edges of it rise steeply from both coasts; but the eastern side is the higher of the two, and the law of a general slope towards the Atlantic is maintained on its surface. The Lake Region occupies the central part of the eastern, or higher side of the South African plateau, and here the line of descent to the coast-land of the Indian Ocean is marked continuously from north to south; first by the southward continuation of the outer slope of the Abyssinian table-land, then near the equator by the edge on which the great mountain peaks of Kenia and Kilima Njaro rise; further south by the Rubeho Mountains, up which Burton and Speke ascended to the plateau; and then by the N'jesa Mountains, which wall in the lake Nyassa. Further south the cataracts of the Shiré river, 35 miles in extent, show where this river tumbles over the edge of the plateau, and the Zambezi breaks through it at the narrows of Lupata. Below this steep edge the coast-land slopes gently to the sea, and is diversified by wide plains or scattered hill ridges.

Inland the high surface of the South African plateau is hollowed out in the wide valleys which contain its lakes and great rivers.

[1] On the supposition that the Chambeze and Kassabi are the head streams of the Congo, this river would have a basin of about 800,000 square miles in extent, and the Nile basin measures nearly 1,300,000 square miles.

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The most northerly of these depressions in the Lake Region is that of the great lake reported by the ivory trader Piaggia, who approached within 60 miles of its northern shore. This lake appears to lie in a high valley on the northern edge of the plateau of South Africa, or rather in a recess of the northern lower land, partly shut in by the slopes of the plateau southward; the mountain range which the traveller saw rising to south-westward beyond the lake, is perhaps only the steep northern edge of the southern plateau here.

The wide depression in which the Victoria lake lies, is shut in eastward by the continuation of the Abyssinian highland into the South African plateau. This valley appears to include the basin of the Bahari N'go, which is believed to be a vast salt marsh, or perhaps a sort of backwater of the Victoria lake, and its slope is to north-westward, towards the angle of the northern lower land which is formed by the inner side of the Abyssinian highland running north and south, and the northern edge of the plateau of South Africa, which has a direction from east to west.

Between these two northern depressions lies the deeper and narrower valley of the Nile, which contains the Tanganyika and Albert Lakes. The beginning of this depression may be said to be at Lake Liemba, which lies sunk 2000 feet down in the edge of the plateau north of Lake Nyassa; then it opens out into a wider valley to the east of Southern Tanganyika, but again closes in the northern part of that lake, and is only a little wider where the Albert lake is sunk between the edge called the Blue Mountains and the part of the plateau which separates this depression from the higher one of the Victoria Nyanza. To south-west of Tanganyika the narrow valley of the Upper Nile appears to have an opening into that one which contains the Chambeze and its lakes, made known by Livingstone, in the low-lying country of the Cazembé.

This valley of Bangweolo and Moero Lakes seems to be most completely surrounded on all other sides by the high broad plateau eastward, by a narrower portion of it called the Muchinga Mountains southward, and again by the Kone Mountains, and a broader part of the plateau, the copper country of Katanga, on the west. The only other opening or outlet into this valley is apparently the 'crack in the mountains of Rua,' through which the river makes its escape to join Ulenge. Westward is another and wider depression—the wide high plain which forms the kingdom of the great Muata Yanvo, watered by the Kassabi river, and stretching out between the Mossamba Mountains where the river rises, and the plateau of Katanga, which separates the Yanvo's from the Cazembe's valley.

The Zambezi valley closes the Lake Region southward. The Zambezi is the exceptional river of Africa, since it breaks through the higher side of the plateau to reach the Indian Ocean. Its sources, however, seem to be also on the inner side of the plateau, springing from the western slopes of the Kone Mountains, and flowing first to the south-westward. The vast basin of this river (568,000 square miles), is comparable to that of the Volga, and would make more than one hundred river basins such as that of the Thames.

On the west, the waterparting of the Zambezi valley at lake Dilolo is apparently but little elevated above the plain of the Muata Yanvo's kingdom; but as the valley descends eastward its northern side appears to rise to the range of the Kone and Muchinga Mountains, and the valley becomes deeper and narrower where it cuts through the high edge of the plateau eastward, to reach the coast.

Lake Nyassa, a tributary lake of the Zambezi, lies in a deep longitudinal hollow near the edge of the plateau, only retained by the high barrier of the Njesa Mountains. The narrow valley of the Shiré river, which flows from it, continues this hollow to the Zambesi. Lake Shirwa is similarly situated, but has no outlet, and in consequence its waters, in distinction to the fresh sweet water of the other lakes, are brackish. The approximate area of each of the eleven great lakes of this region, so far as their extent is known, is as follows :—

	Square Miles.
Victoria Nyanza,	29,900
Albert Nyanza,	25,400
Piaggia's Lake,	11,000
Tanganyika,	10,400
Nyassa,	8,600
Bahari Ngo,	6,000
Bangweolo,	3,700
Moero,	2,000
Ulenge,	1,000
Shirwa,	800
Liemba,	700
	99,500

The whole extent of water surface in this Lake Region is then nearly 100,000 square miles, an area not far short of that of the British Isles. A more definite notion of the great extent of these inland seas of fresh water may perhaps be obtained, if we observe that a direct passage across the Victoria lake, from shore to shore (in

its presently believed extent), corresponds in length to a voyage over our North Sea from Hull to Rotterdam, or from the eastmost land of Scotland at Peterhead, to the Norway coast.

The more important of the rivers of the Lake Region have been noticed in speaking of the routes taken by the travellers who have discovered them. One of the main hinderances to the exploration of South Africa, is the difficulty of making use of these rivers as highways into the continent. The coast rivers of the Lake Region, or, indeed, of the whole of Eastern Africa, are barred at their mouths by the aggregated debris which they carry down, raised in banks on the coast between the downward current of the river and the opposing monsoon, or trade wind, blowing towards the coast. If this bar is passed at the mouth, still, the navigation even of the largest rivers cannot cross the edge of the plateau where cataracts and rapids form a new obstruction. The vast lakes of the interior, and their connecting rivers, however, present great lines of navigable water, which, in a higher civilisation, would be utilized for busy traffic, the line of the Nile basin in the Tanganyika and Albert lakes alone affording an unbroken voyage of about 900 English miles.

Piaggia, the traveller who has been nearest to the great lake which lies to the north-west of the Albert Nyanza, reports a large river called the *Buri*, flowing to westward, at some days' journey from Kifa (his furthest point), and which issues out of his great lake. The same river has been reached, at some distance from its supposed outlet, by the brothers Poncet (French ivory traders), who have long resided in this region, and they express the opinion that this river unites the equatorial lakes with lake Tchad, by means of the Shari river. This they proposed to prove by an expedition on it in boats. The question, what becomes of this great river, which, at its outlet from the lake, is so large as to be only passable in canoes, is an interesting one. It is certainly no tributary of the Nile, and the two most probable lower courses which it may have are those of the Shari to lake Tchad, or of the Benue river to the Niger. If it ultimately proves to flow to lake Tchad, it will give a striking evidence of the vast amount of evaporation which must exist in the region of that lake, since it has no outlet; but the Benue river seems to be its more probable course, for at its confluence with the Niger, the Chadda or Benue, is the larger river. The Ogowai river is also a possible lower course for the Buri, but if the lake reported by Piaggia be, as we suppose, on or beneath the northern edge of the plateau of South Africa, it seems only natural that the river from it should seek the lower land to northward, than turn westward along the northern slope of the plateau.

THE NATURE OF THE SURFACE OF THE LAKE REGION AND ITS CLIMATE.

Africa, the only one of the continents which has a large extent of land on each side of the equator, presents a series of zones, each of which has a different nature of surface, and these belts correspond very closely with one another on the opposite sides of the equator. The central area of Africa, below the equator, in the zone of long rainy seasons, is a region characterized by dense forests, and a most luxuriant overgrowth of vegetation, comparable to that of the selvas of the Amazon river in South America, which occupy the same equatorial position on the globe. To north and south of this forest zone is a belt of less wooded country, merging gradually into open cultivated or pasture lands. Next, these grass lands pass into the two great almost rainless deserts of the Sahara in the north, and of the Kalahari southward. Beyond the deserts, at the extremities of the continent, the outer slopes of the Cape Colony in the south, and of the plateau of Barbary, the 'Tell' country, in the north, present a second zone of fertile and cultivated land.

The Lake Region extends from this central forest zone, in which the equatorial lakes are formed, through the more open belt of less wooded country southward, as far as the Zambezi valley, and this area is almost every where adorned with the choicest natural varieties of shady forest, with luxuriant underwood, or clumps of trees with rich grassy plains between.

Nowhere more than in this central region of Africa are the subjects of temperature, rain, and winds, more closely interwoven, or mutually dependent, the one upon the other. In the passage of this tropical region beneath the sun, a low atmospheric pressure is produced by an ascending heat column, and by the condensation of vapour in this; the winds flow into the ascending column, and bring with them the moist air of the ocean, which, condensing in copious floods of rain, reduces the temperature, whilst causing a further opening, into which the winds blow with increased power. The column of low pressure, with its attendant winds and rains, always tending towards that part of the continent which is vertically beneath the sun's rays, and thus moving up and down the face of the land within the tropics, gives the wet and dry, the cold and hot, seasons of the year in this region. On the coast the seasons are sharply defined: the continental and the oceanic monsoons dividing the year between either a single or a double wet and dry season; but in the high central plateau in which the lakes are situated, the winds are drawn into the pendulating

area of low pressure from the ocean, nearly throughout the year, and it is only when extreme limits of the tropical zone come directly under the sun, that a higher barometric pressure, an outflow of the winds, and a consequent dry period, is experienced here.

In the east coastland under the equator, the country explored by the German traveller Brenner, the mean temperature of the year is 85°.1 (mean of three daily observations); the highest observed temperature (of 92°.8) having occurred in January, and the lowest (73°.4) in May. The rainy season here sets in with the south-east monsoon in April, and lasts till the end of June. The second rainy season, which we shall notice, taking place farther south in September and October, is almost lost at the equator, or is only marked by a few showers. The north-east monsoon brings a cloudless sky of clear blue, and begins to blow here in November, lasting till March, and in this season rain is never thought of.

At Zanzibar Island, six degrees south of the equator, the mean temperature of the year is nearly 80° Fahr., rising in January to an average of 83°, falling in July to 77°; and it has a double rainy season, a stronger in March, April, and May, when the low pressure has passed this latitude in moving northward; and again in a weaker in September and October, when the low pressure column passes in its southward course, at which times the monsoon winds change from the north-east, blowing out of Asia towards South Africa, to the southwest, blowing from Africa towards the Asiatic continent; so that the climate of Zanzibar is equally ruled by these two great land masses. In the low countries, beneath the edge of the plateau, about Zungomero, Burton tells us that the rain is constant, except for a single fortnight in the month of January; at most times the sun shines through a veil of mist with a sickly blaze and a blistering heat, and the overcharge of electricity is evinced by frequent and violent thunderstorms. On the Mozambique coast the winds are again ruled by the African continent only, and the year is divided into a dry and wet season. From April till November the undeflected south-east trade wind blows upon this coast, and either from the lowness of the land or the shelter it obtains from the high island of Madagascar, this wind brings the dry season. From November to March the north-east monsoon, here at its furthest south limit, having passed over the warm Indian Ocean, brings the rainy season.

On the plateau inland, the climate and seasons are different, and the commencement of the rainy season rather precedes than follows the vertical sun. The mean annual temperature of the table-land in the neighbourhood of the Victoria N'yanza was found by Speke and

Grant to be only about 68° Fahr., a temperature not greater than that of the south coasts of the Mediterranean, a climate not unsuitable to Europeans, since a hot summer in England is far more oppressive.

The rainfall in this high region is also an exceptionally small one for a tropical country, having been found to be only about 49 inches, or not so much as that of many places in England, and this may perhaps be accounted for by the fact that this part of Africa is deprived of all rain from northerly winds which come overland, and the prevailing east winds appear to lose much of their moisture on the high eastern slopes of the plateau before reaching this region.

The traveller Burton gives an account of the very different climate of the deeper valley of the Tanganyika lake. Here the rains divide the year into two unequal portions of eight and four months,—namely, the wet monsoon, which commences with violence in September, and lasts till May, and the dry hot weather which completes the year. During the wet monsoon (1858) the prevalent winds were constantly changing. The most violent storms came up from the south-east or south-west. In the plateau of Umyamwesi, to eastward of the lake he says that there are but two seasons, a summer and winter, and the rains begin here in the middle of November. 'The moisture bearing wind in this part of Africa is the fixed south-east trade, deflected into a periodical south-west monsoon.' Further south in the Cazembe's country, the rainy season appears from Dr Livingstone's letter to begin in October, and he says that the floods in the country west of Tanganyika last till May or June. In the northern part of the Zambezi valley the traveller Silva Porto found the rains setting in on the Arangoa river in February, and ending on the eastern side of the Nyassa, in June.

On the Zambezi river in the Makololo district, Livingstone observes that the rain follows the course of the sun, since it falls first in October and November when the sun goes over this zone southward. When the tropic of Capricorn is under the sun in December, it is dry, and December and January are the months in which the droughts are most severe in the countries between the Zambezi and the Kalahari. When the sun turns again to northward in February, March, and April, the great rains of this part of the Zambezi valley are experienced.

POPULATION OF THE LAKE REGION.

The lake regions of Africa are well peopled. Behm, in his Geographical Year-book, has estimated the population of that part of

Eastern Africa which lies between the equator, the line of lake Tanganyika, the Cazembe's country, and the Portuguese colonies on the coast, at 3,500,000. This gives a density of population of about six to a square mile, but this is apparently rather under than above the mark. It is true that the slave trade must reduce and disturb, to a great extent, the population of this part of Africa, since many thousands of slaves are annually brought down to, and exported from the coast; but, on the other hand, travellers in this region report a continuous population. Captain Grant describes the part of the lake region which he traversed as too thickly peopled to harbour many wild animals; the shores of lake Tanganyika are, according to Speke, 'thickly inhabited by numerous tribes;' and in his voyage on lake Nyassa, Livingstone says, 'Never before in Africa have we seen anything like the dense population on the shores of lake Nyassa, especially in the south. In some parts there seemed to be an unbroken chain of villages. On the beach of well-nigh every little sandy bay, black crowds were standing gazing at the novel spectacle of a boat under sail.'

The inhabitants of the Lake Region appear to belong entirely to the negro or negroid race, but are closed in to north and south by peoples of a different stamp.

The Niam Niams who inhabit the country north of the lake reported by Piaggia, and west of the Albert lake, who formerly had the reputation of being 'half men and half dogs, with a fan-like tail,' and of having a disposition to eat their fellow-creatures, prove, on nearer inspection by the traveller Piaggia, to be men of powerful, regular, and fine figure, of stately carriage, with bronze coloured skin, long hair, and thick beard, barbarous indeed in their customs, but not cannibals. They are considered to be identical with the interesting race of the *Fellatah*, the dominating people of the western Soudan, or are perhaps a step between these and the Gallas of the east.

Burton thus describes the peoples he met with between the east coast and the lake region :—

The Sawahili of the Zanzibar coast are sprung from the intercourse of foreign traders and emigrants, Phœnicians, Jews, Arabs, and Persians, with the African aborigines. The Balonda people of the kingdom of the Muata Yanvo, to the west of lake Tanganyika, are almost pure negroes; and between these and the east coast, there is a tolerably regular gradation of negroid races from east to west, brought about partly by long intercourse with foreign settlers, and in part by intermixture with the non-negro races of North Africa. The high road from the coast to Ujiji runs through com-

paratively quiet and peaceful races. Cannibalism,' says Burton, 'is rare in Eastern Africa, and results either from policy or necessity.'

The aspect of the great mass of this negroid race is not unprepossessing. They are tall and well made mulattoes, rather above the European standard. A giant or a dwarf is never seen. The people of the maritime regions have rough dirty skins of a dull pale black, like that of diluted Indian ink; from the central elevation of the eastern plateau the complexion improves, and further inland the yellow skin, so much prized in Eastern Africa, appears. From the Unyamwesi plateau to Tanganyika lake, in those lower levels where heat and humidity are in excess, the people become lamp black, without a shade of brown. The negroid races appear to extend down the outer slope of the continent to near the Zambezi valley southward.

Livingstone speaks of the peoples of the shores of Lake Nyassa as negroes; and Silva Porto describes the natives he met with in the northern watershed of the Zambezi valley, as 'hospitable negroes.'

The river Zambezi is nearly the boundary between the negroes or negroids of the Lake Region, and the Kaffir races of South Africa.

South of the Zambezi the kingdom of the chief Mosilikatze has been made up of the remains of a number of formerly independent tribes conquered by the Matebele Kaffirs pushing northwards; and the Makololo kingdom, in the Upper Zambezi valley, was established by a former ruler, who led this conquering Kaffir tribe from the head of the Orange river northward, and incorporated the vanquished tribes with this one to form his kingdom.

The most important kingdom of South Africa is the empire of the Muata Yanvo, whose subjects are purely negroes. The dominion of this potentate seems to reach from the Mossamba Mountains at the head of the Kassabi river westward, to the town of Shinte, on the Leeba river, and the Muchinga Mountains southward, and thence round to the southern part of the Tanganyika lake.

The northern extent of this kingdom is probably marked by the middle eastward course of the Kassabi, which is said to enclose it. The Muata Yanvo's empire includes that of the Cazembe, who is his vassal, and who rules for his sovereign over that part of the kingdom which is separated from the main portion by the desert or mountainous country of Katanga. The fertile and thickly peopled area, known to be under the sway of this great Central African ruler, is far greater than any of the kingdoms of Western Europe, and might be compared in extent to the united bulk of France and Italy.

In conclusion, we may glance at the enormous labours of the great traveller Livingstone, to whom the world is indebted for so vast a portion of its knowledge of the African continent, and whose recent travels have given a fresh interest to this part of the globe. The area of South Africa, which Livingstone has already explored, and not only explored, but in great part surveyed with accuracy, has an extent of about one million of square miles. It is difficult to form a correct notion of the space covered by such an area, but it may help to give an idea of the work which has been accomplished, if we remember that the united areas of all the western kingdoms of Europe—France, Austria, Germany, Italy, Spain—would scarcely make up the extent of land which Livingstone has virtually added to the known world.

NOTE.

AUTHORITIES USED IN THE COMPILATION OF THE MAP.

Since the value of any map, more especially one of a partly explored region, depends upon the care in the selection of the materials to be used, and in the comparison and choice of the positions ascertained, either astronomically or by distance and direction, by the various travellers in the area which the map embraces, it becomes necessary that a short written note of these should accompany the map. For want of such a memoir, very many original maps, which would otherwise have the highest value, are rendered comparatively useless to the chartographer, since from the sheet itself he can form no estimate of the reasons for, or the accuracy of, the compiler's choice of one position or distance in preference to another.

For the coast line of the map of the Lake Region the most recent editions of Admiralty Charts have been used.

These are, beginning at the south:—

No.	1810.	Masangzani R. to Primeira Is., by Capt. Owen,	corrected to	1864
,,	651.	Primeira Is. to Mozambique Harbour	,,	1866
,,	1809.	Mozambique to Pomba Bay,	,,	1869
,,	675.	Querimba Islands,	,,	1864
,,	658.	,, ,,	,,	1865
,,	1808.	Cape Delgado to Quiloa,	,,	1865
,,	662.	Quiloa Point to Motumoka Point,	,,	1869
,,	664.	Zanzibar and Pemba Islands,	,,	1867
,,	1811.	Chala Point to Kwyhoo Bay,	,,	1865
,,	670.	Kwyhoo Bay to the Juba River,	,,	1864

The routes, distances, and directions given by the traveller Piaggia, in the description of his journey in Petermann's Mittheilungen, 1868, bring Kifa, his furthest point, almost coincident with the position given to this place by Von Heuglin's estimate, so that this position has been adopted. The situation of the lake in Piaggia's description is relative to Kifa, and so it has been laid down in the map to the north-westward of the Albert lake.

For the Albert Nyanza, the map of that lake, and of the routes leading to its discovery, by Samuel White Baker, published for the Proceedings of the Royal Geographical Society in December 1865, has been used; and for the reasons given by this traveller, the Asua river has been disconnected from its union with the Bahari N'go, as supposed by Speke. The Victoria and Tanganyika lakes have been laid down from the 'map of routes in Eastern Africa between Zanzibar, the Great Lakes, and the Nile,' by Capt. J. H. Speke, published in the Journal of the R. G. S. in 1864. The coast country between the Juba river and the Pangani, above Zanzibar, is supplied by the 'Original Karte des Gebietes der Südlichen Galla u. Waboni, nach seinen Reisen in 1866–67, von R. Brenner,' in which also the routes of Von der Decken, Kinzelbach, and Wakefield, have been incorporated, published in Petermann's Mittheilungen, 1868. The indications of the form and hydrography of the country between lake Nyassa and the east coast are from the uncertain route of Dr Roscher to the Nyassa, as laid down in Petermann's map of South African discoveries up to 1867, and partly from the route of Silva Porto, from the south end of the lake to the Rovuma river. The lower course of this river is taken from Dr Livingstone's boat survey of it, as given in Arrowsmith's map, afterwards noticed, and from the Admiralty Chart of the mouth of the Rovuma river (No. 83), by D. May, R.N., 1861. The 'Map of the River Shire, the Lakes Nyassa and Shirwa, and the lower courses of the rivers Zambezi and Rovuma, based on the Astronomical Observations and Sketches of Dr Livingstone,' by John Arrowsmith, has been used for the whole of these features, excepting that the position of the town of Sesheke has been retained in the place which it occupies (fixed by Dr Livingstone's observations in 17° 31′ 38″ S., 25° 13′ E.) on Arrowsmith's former map of Livingstone's routes across Africa, which has been used here for the upper course of the Zambezi, so far as it is known, and for the Leeba tributary to lake Dilolo.

The position of the Muata Yanvo's capital of Kabebe is that given to it by the original map of his routes by Ladislaus Magyar, corrected by the positions ascertained by Livingstone in this region, as discussed in Petermann's Mittheilungen of 1860. The country between this and the Cazembe's dominions is laid down from a re-construction of the routes of the Pombeiros, before referred to, as translated by Cooley. Silva Porto's route (Macqueen in R. G. S. Journal, vol. xxx.) gives the indications of the hydrography and mountain features of the country between Katongo, on the Upper Zambezi, and the Arangoa river; and it is from his route chiefly that the Muchinga range has been placed on the map: this meets the routes of Lacerda (whose two astronomical positions are indicated) and of Monteiro, from Tetè to the Cazembe's town, the position of which latter is

laid down from Monteiro's route, checked by Lacerda's astronomical points. The country south of the Zambezi has been drawn from the 'Original Karte von C. Mauch's Reisen zwischen Potchefstr[illegible]d Zambezi,' 1865–1869, Map I. in Petermann's Mittheilungen, 1870.

The remainder of the map is constructed from the information contained in Livingstone's letter, of date July 1868, from Lake Bangweolo.

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